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H4L LED

(56) Documents Cited

None

(58) Field of Search

UK CL (Edition R) **H4L LED**

INT CL⁷ **H04Q 7/22 7/32**

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(54) Abstract Title

Digital mobile phones with data communication services

(57) A digital mobile phone provides data communications services to a PC connected to it by a data cable. Connection state data in the form of a binary data cable flag is stored in a given region of a memory of the mobile phone and the phone periodically checks the connection state of the data cable to revise the data cable flag. The flag indicates whether or not the connection state of the data cable is normal. If so, data communication is performed; otherwise it is not.

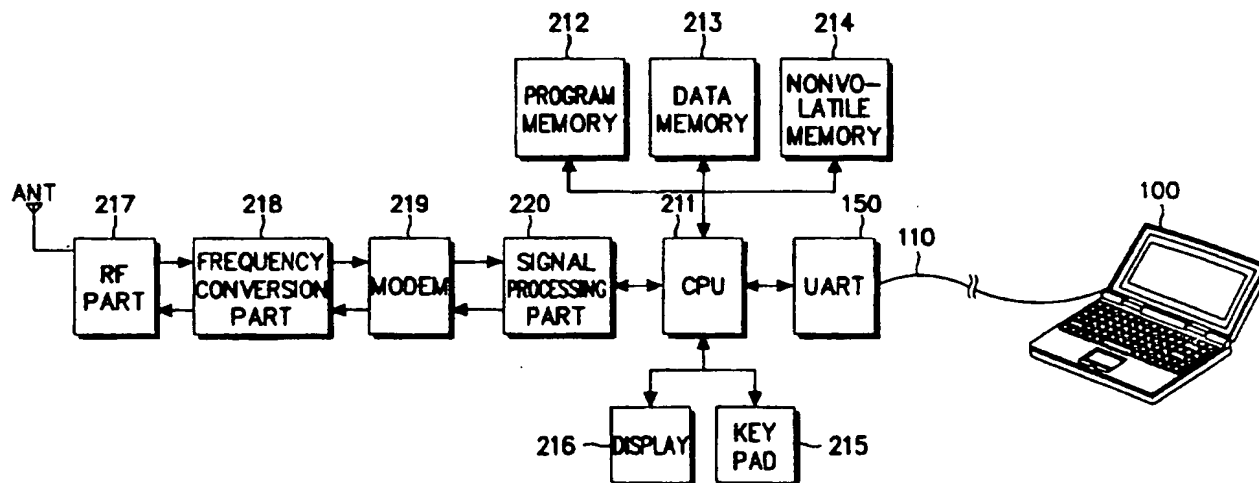


FIG. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

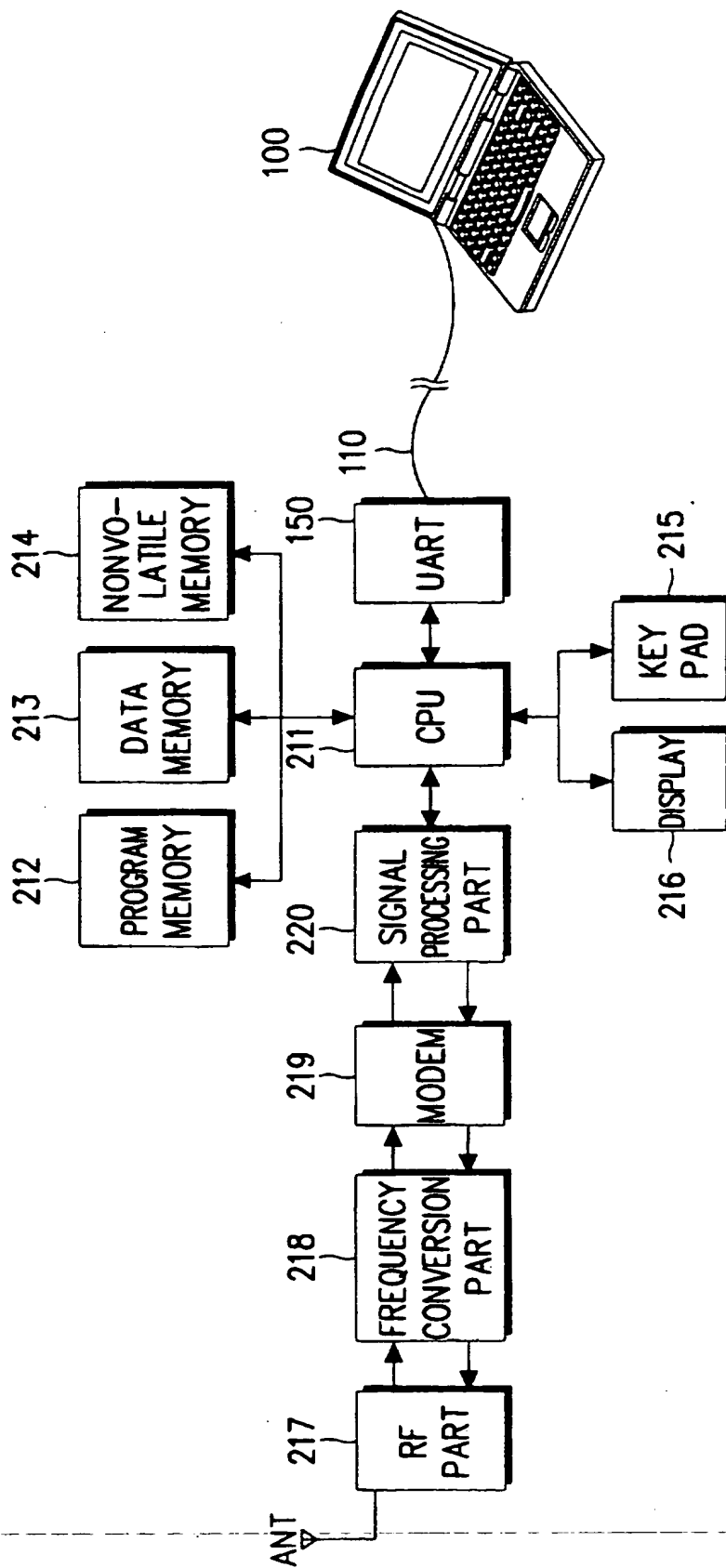


FIG. 1

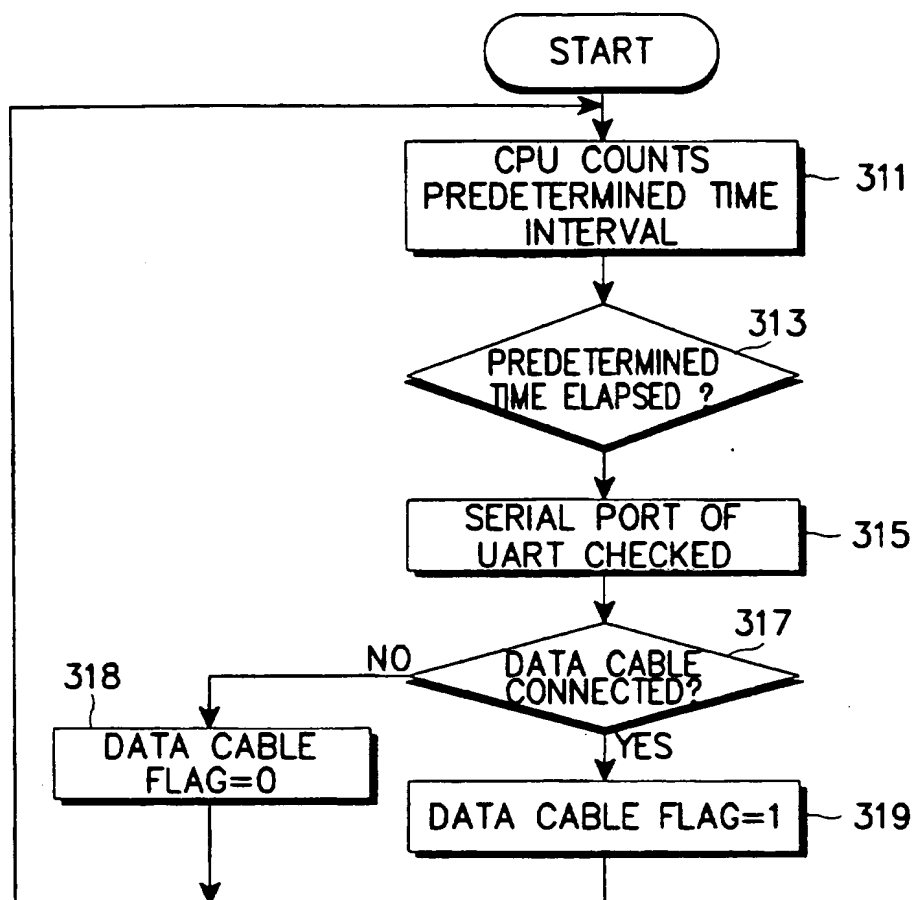


FIG. 2

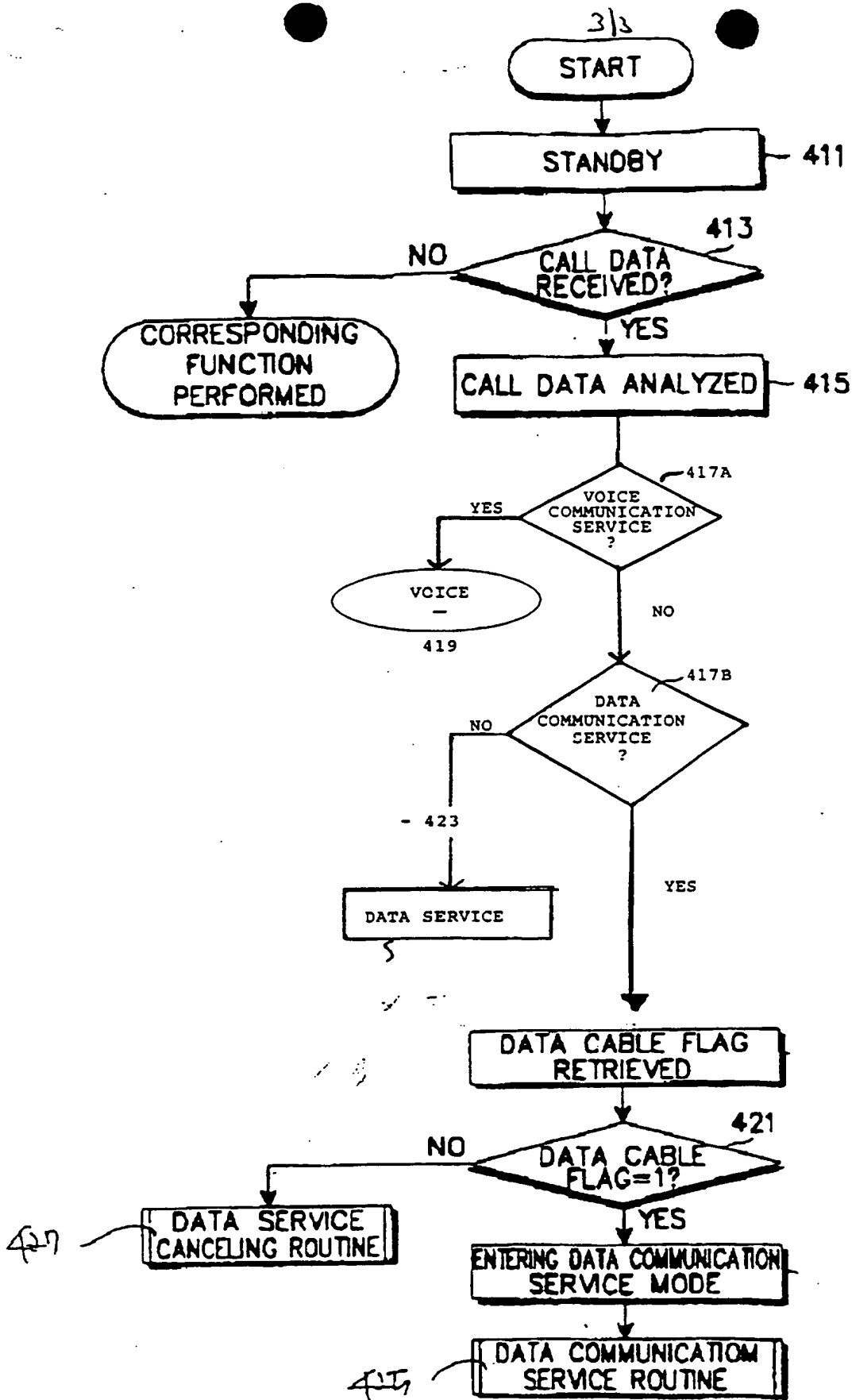


FIG. 3

DIGITAL MOBILE PHONES WITH DATA COMMUNICATION SERVICESBACKGROUND TO THE INVENTION

5 The present invention relates to a digital mobile phone that provides data communication services for a personal computer (PC) connected to it.

Generally, digital mobile phones are designed to provide
10 data communication services for an external PC connected to it, to exchange data files with another computer or a fax machine through a radio channel allotted for voice communication. However, such conventional mobile phones have no means of detecting the state of the data cable
15 connecting the PC with the mobile phone, so that, even though the data cable may inadvertently be disconnected from them during data communication, it continues the communication without detecting such disconnection. This causes the mobile phone service provider to bill the user
20 even for the time during which he did not receive the data services because of the disconnection of the data cable.

SUMMARY OF THE INVENTION

25 It is an object of the present invention to overcome this problem of undesired billing.

According to the present invention, there is provided a digital mobile phone that is adapted to provide data
30 communication services to a personal computer connected to it through a data cable only when a predetermined

indicator of the connection state of the data cable indicates that it should do so.

The said predetermined indicator may comprise connection state data stored in a given region of a memory of the mobile phone, with the mobile phone adapted periodically to check the connection state of the data cable to revise the said connection state data. That data may for example be a binary data cable flag indicating whether the connection state of the data cable is normal.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a block diagram of a digital mobile phone connected through a data cable with an external PC;

Fig. 2 is a flow chart of the process of checking the connection state of the data cable; and

Fig. 3 is a flow chart of the process of providing data communication services.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1, the data communication between the mobile phone and PC is controlled by a central processing unit (CPU) 211 controlling the functions of the mobile phone. The program for controlling the functions of the mobile phone is stored in a program memory 212, which may be a flash memory. The data temporarily generated from the operation of the mobile phone is stored in a data memory 213, which may be a random access memory (RAM). A

non-volatile memory 214 is provided to store phone numbers for shortcut dialling including system parameters. It may be an EEPROM. A key pad 215 generates key signals representing the commands to control CPU 211 and data.

5 State information relevant to the operation of the mobile phone is displayed on the display 216 under the control of CPU 211. The display 216 may be an LCD. The communications part of the mobile phone includes an RF part (radio frequency interface) 217, frequency conversion part 218, modem part 219, and signal processing part 220, which are controlled by CPU 211. The signal processing part 220 comprises an encoder (interleaver & encoder), decoder (de-interleaver & decoder), vocoder, and PCM codec. It is noted that the transmitting and receiving parts are not

10 separately described in the drawing. Also omitted in the drawing are the lines representing the control of CPU 211, sound signal processing circuit, etc.

15

In the transmission mode, the transmitted data is encoded

20 by the signal processing part 220, modulated by the modem part 219, subjected to frequency-up-conversion of the frequency conversion part 218, band-pass filtered and amplified by RF part 217, and finally transmitted through the antenna. On the other hand, in the receiving mode, a

25 weak RF signal received through the antenna is low-noise amplified and filtered into the base band by RF part 217, subjected to frequency-down-conversion of the frequency conversion part 218, demodulated by the modem 219, and decoded by the signal processing part 220.

30

CPU 211 performs data communication with PC 100 through a

UART (Universal Asynchronous Receiver Transmitter) 150 in asynchronous transfer mode (ATM), as shown in Fig. 1. UART 150 is a serial/parallel conversion ATM transceiver to enable data communication between the mobile phone and PC 100. The PC and UART 150 are connected by a data cable 110 supporting serial communication used for exchanging data between the mobile phone and PC.

The detection of the connection state of the data cable will be described with reference to Fig. 2. CPU 211 works in step 311 to count repeatedly a given time that is predetermined for CPU 211 to periodically check the state of the serial port of UART 150. When the given time has passed in step 313, CPU 211 checks the serial port of UART 150 in step 315 to determine whether UART 150 and PC 100 are normally connected by the data cable. When the connection of the data cable is checked to be normal in step 317, CPU 211 sets the data cable flag stored in a given region of the memory 213 to "1" in step 319. This allows CPU 211 to determine whether the data communication services may be normally performed between the mobile phone and PC 100. However, if the connection of the data cable is checked to be abnormal in step 317, CPU 211 sets the data cable flag to "0" in step 318. As regards the data cable flag, it may be defined in a given region of the non-volatile memory 214 instead of the data memory 213. Subsequently to step 318 or 319, the process returns to step 311.

Referring to Fig. 3, when the mobile phone is in standby mode in step 411, CPU 211 detects call data received

through the communications part as shown in Fig. 1 in step 413. If there is no call data received in step 413, corresponding functions are performed such as editing phone numbers, entering key inputs, etc. However, when
5 call data is received in step 413, it is analysed in step 415 to determine in step 417 whether it represents data communication service or voice communication service. If the call data represents data communication service in step 417, the process goes to step 419 firstly to re-
10 trieve the data cable flag periodically revised from the data memory 213. Then, in step 421, it is determined whether the connection state of the data cable is normal according to the value of the data cable flag. If the flag is detected as "1", the data cable is normally
15 connected with UART 150 so as to properly provide data communication service in step 423, and the data communication service routine is called. Of course, the processes of Figs. 2 and 3 are repeatedly performed to continuously check the connection state of the data cable.
20 On the other hand, if the data cable flag is not detected as "1" in step 421, the connection of the data cable is abnormal, and data communication service is stopped or the data communication cancelling routine is called.

25 Thus, the invention provides means for continuously checking the connection state of the data cable to determine whether the connection between the mobile phone and PC is normally maintained, so that the user may be freed from an unreasonable billing involving a fee charged for
30 the services performed during the inadvertent disconnection of the data cable.

CLAIMS

1. A digital mobile phone that is adapted to provide data communication services to a personal computer connected to it through a data cable only when a predetermined indicator of the connection state of the data cable indicates that it should do so.
2. A digital mobile phone according to claim 1 adapted to provide such data communication services when call data received indicates it should do so.
3. A digital mobile phone according to claim 1 or claim 2 in which the said predetermined indicator comprises connection state data stored in a given region of a memory of the mobile phone and the mobile phone is adapted periodically to check the connection state of the data cable to revise the said connection state data.
4. A digital mobile phone according to claim 3 in which the connection state data is a data cable flag indicating whether the connection state of the data cable is normal.
5. A digital mobile phone according to claim 4 in which the data cable flag is a binary flag.
6. A digital mobile phone that is adapted to provide data communication services to a personal computer connected to it through a data cable, the digital mobile phone being substantially as described herein with reference to the accompanying drawings.



Application No: GB 9921043.7
Claims searched: all

Examiner: Nigel Hall
Date of search: 25 February 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.R): H4L (LED)
Int Cl (Ed.7): H04Q 7/22S, 7/32
Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	NONE	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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